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GERMAN SCHOOL CHEMISTRY.

Methodik des chemischen Unterrichts. By Dr. Karl Scheid. Pp. xv + 448. (Leipzig: Quelle und Meyer, 1913.) Price 20 marks.

EDUCATIONAL restlessness, so characteristic of the times in England, prevails to a scarcely less degree in the country to which we are so often directed to turn for pedagogic inspiration; and the agitation about methods of teaching science is not the least remarkable example of the contemporary stir in the educational world of Germany.

The present volume is the fourth of a series constituting a handbook of scientific and mathematical instruction issued under the editorship of Dr. J. Norrenburg, and is written by a professor of the Realgymnasium mit Oberrealschule at Freiburg in Breisgau. "Knapp und einfach in der Form," it is declared to be by the editor; "Knapp" it may be by Teutonic standards, but it extends to about 450 large pages, and it "grinds exceeding small," as books on Methodik are apt to do in every language. However, the work is of much interest, and to a large degree readable. It refers to German boys' schools, and the terminology of the German system, with its slight and subtle variations, presents some difficulty to the English reader.

The first or general part of the book gives an account of the history of chemistry teaching in German schools, a description of its present condition, and of the various recommendations and criticisms that have been made by scientific, medical, or industrial authorities. The general educational principles involved in science teaching are discussed at considerable length with a great deal of division and sub-division. The second or special part of the book gives the outline of a suggested course of school chemistry.

The chief impression produced by reading this account of German school science is the comfortable one that we in England are well in advance of Germany in our attempts to make science worthy of its place in the school curriculum. It is somewhat remarkable that a German writer should have paid such little attention to what has been going on in other countries. There is a eulogistic reference to Faraday's "Chemistry of a Candle," but no allusion to the very great work that has been done in England during the last twenty-five years towards improving school science.

The difficulties recounted by Dr. Scheid, the unsatisfactoriness of the traditional methods, and the obstacles to reform, are very much the same as we have known here. There has been a strong academic prejudice against the intrusion of science into the school curriculum; the science that has been taught has been diluted university science administered dogmatically; sciences have been artificially severed; they have been detached from living nature and from human interests; they have resulted in a thing of shreds and patches that has been of no account for any terrestrial or celestial purpose. Against all this a rebellion has been fermenting; the demonstration is condemned; the pupils are to work in laboratories; they are to be put into the position of discovering rather than of being told; things, in fact, are moving as they have moved here, but they have not moved so fast.

There are many wise things said in the book, which, if they are not new, are the things that need to be said again and again. Dr. Scheid insists, for example, that the school teacher must remember that he has not got a collection of prospective chemists before him; that the method of teaching is more important than the range of matter; that every occasion must be taken to connect school teaching with the realities of life and industry; that the artificial tendency, not imposed by nature, between natural history and the exact sciences must disappear, if the realistic (*i.e.* modern) schools are to be true educational institutions in a thorough cultural sense. Only then will the Ober-realschulen and Realgymnasien be in a position to give a scientific education equivalent to the humanistic one. The distribution of different branches of science to different teachers, the severance of physics from chemistry, are deprecated. Chemistry dissociated from physics, says the author, is resolved into a mosaic of details. Boyle, Dalton, and Davy were chemists and physicists in one person.

The course of chemistry outlined by Dr. Scheid is not quite like those which have supplanted the old academic courses that prevailed in this country. He begins with limestone, and makes it the object of some fundamental observations, partly quantitative, passing then to air and combustion. Sulphur and sulphuric acid lead to hydrogen, and then comes water. Flame, salt, and hydrochloric acid, quantitative experiments on the laws of combination, carbon and carbon dioxide, carbonates, nitrogen compounds, phosphorus, silicon, and the heavy metals—these complete the topics of the lower course. The higher is more like the traditional systematic course. Proposals for the treatment of organic chemistry begin with alcohol, and include a restricted list of the substances and topics related more especially to everyday life.

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Whilst the course suggested is in many respects interesting, and no doubt a great improvement on much that has prevailed, it does not seem to be better than many that are now being followed in this country.

It is well known that the prominent position taken by Germany in chemical science is in no degree due to the quantity or quality of the chemistry in its schools. We still hear, indeed, from time to time, of the pronouncement made a score of years ago by a group of eminent German chemists to the effect that a classical education was to be preferred above all else as a preparation for the serious study of science. This pronouncement is akin to many that are heard in the world of education, and is of the nature of those half-truths which are so particularly mischievous. Just as in this country, so long as modern studies were disdained and were the resort of the less intellectually gifted, and so long as modern studies were being taught on a vicious model, ancient studies might well seem to be the best preparation for every kind of higher training.

It will be interesting to see the face of German education when Dr. Scheid and his coadjutors have achieved their reform of its school science. Meanwhile it matters much less in Germany than here whether school science is good or bad, for in Germany there is plenty of education, and of good education, of some kind; there is a sincere belief in it; there is a sincere belief in science; and there are plenty of men sufficiently well trained to keep the country eminent in science and pre-eminent in the application of scientific knowledge to the welfare of the State.

ARTHUR SMITHELLS.

ZOOLOGICAL BIBLIOGRAPHIES AND CATALOGUES.

(1) *Catalogue of the Books, Manuscripts, Maps, and Drawings in the British Museum (Natural History).* Vol. iv., P—SN. Pp. 1495–1956. (London: British Museum (Natural History); Longmans, Green and Co., 1913.)

(2) *A Bibliography of the Tunicata*, 1469–1910. By John Hopkinson. Pp. xii+288. (London: The Ray Society; Dulau and Co., Ltd., 1913.) Price 15*s.* net.

(3) *Catalogue of the Noctuidæ in the Collection of the British Museum.* By Sir G. F. Hampson. Plates cxcii–ccxxi. (London: British Museum (Natural History); Longmans, Green and Co., 1913.)

(4) *Catalogue of the Ungulate Mammals in the British Museum (Natural History).* Vol. 1, Artiodactyla. Family Bovidæ, Subfamilies Bovinæ to Ovibovinæ. By R. Lydekker, F.R.S. Pp. xvii+249. (London: British Museum (Natural History); Longmans, Green and Co., 1913.)

(1) THE British Museum of Natural History continues to issue at frequent intervals a series of extremely useful catalogues, guides to the collections, or other valuable volumes. Not the least welcome of these to workers in the museum, although probably not of general interest to the public, is the "Catalogue of the Books, Manuscripts, Maps, and Drawings." This, under the superintendence of Mr. B. B. Woodward, the librarian, is still in course of completion, and vol. iv. now lies before us. Starting at P, it brings the entries under authors' names down to SN. We learn from the director's preface that the first sheet was passed for press in October, 1910, and the issue of this volume marks a distinct advance in cataloguing a library, the value and richness of which is probably known to very few of the public.

(2) A catalogue of a very different nature is Mr. John Hopkinson's "Bibliography of the Tunicata," from 1469–1910, compiled for the Ray Society. This was commenced for the private use of its author in connection with the publication by the Ray Society of the late Messrs. Alder and Hancock's "British Tunicata." During the course of its completion it was found to contain so many references not in any previous bibliography that it appeared to Mr. Hopkinson that if printed it might be useful to others—a surmise which we expect will prove correct, as the bibliography, which must have involved immense labour, has been very carefully prepared.

(3) A second volume issued by the British Museum contains plates 192–221 of Sir George Hampson's "Catalogue of the Noctuidæ." In this a large number of species are illustrated, the work having been carefully executed by Messrs. West, Newman and Co. The colours have been very well reproduced; each species is named, and a reference given to its habitat and the page on which it is described.

(4) The first volume of Mr. R. Lydekker's "Catalogue of the Ungulate Mammals" deals with the cattle, sheep, goats, chamois, takin, and musk-oxen. Owing to the large size of most of the species and the relatively small number of specimens available, the work is written on lines different from those governing other catalogues. Real systematic detail and thorough conciseness of description cannot be attained until a much larger series of specimens can be accumulated. Instead, although the principle of priority in scientific nomenclature has been adhered to, an

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